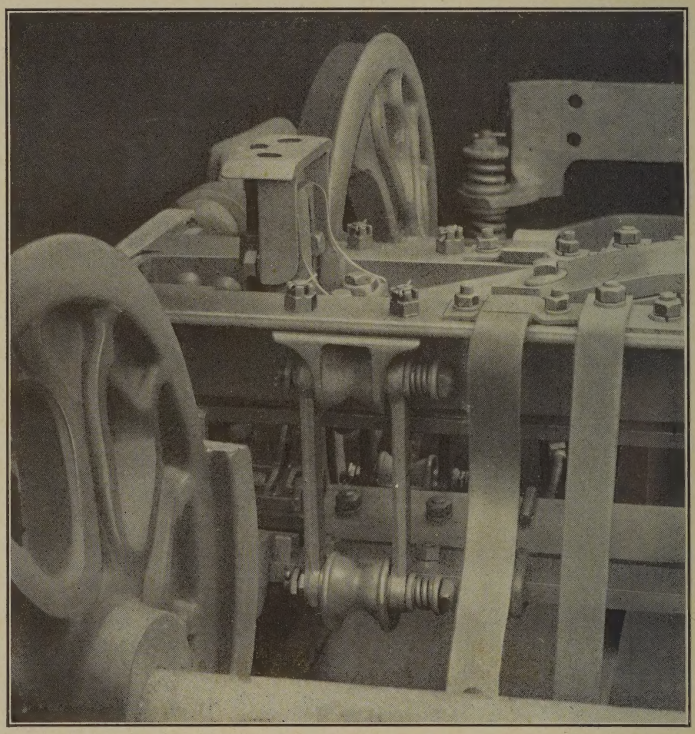
Vol. VII MARCH, 1913 No. 3

BRILL MAGAZINE

Main Street
Rochester, N.Y.



BRILL HALF-BALL BRAKE HANGER

In addition to the large number of electric roads using these hangers by virtue of using Brill trucks, two hundred and forty-three other roads, after severe tests, have successfully adapted them to other makes of trucks, because they are noiseless, self-adjusting for wear and self-cleaning; have long life, and the release springs insure freedom from brake-shoe drag against the wheels, consequently eliminating wasteful wear.

THE J. G. BRILL COMPANY
PHILADELPHIA, PENNSYLVANIA

W. J. Crowley

General Manager, The American Railways Company

BRILL MAGAZINE

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Vol. VII MARCH, 1913 No. 3

HENRY J. CROWLEY

[WITH PORTRAIT INSERT]

HENRY J. CROWLEY, general manager of The American Railways Company, was born in Unionville, Conn. After completing a four years' apprenticeship with the Pratt & Whitney Company of Hartford, he entered the locomotive shops of the New York, New Haven & Hartford Railroad Company. His first electrical experience was with the Schuyler Electric Light Company, constructing electric lighting plants in New England, Pennsylvania and Ohio. In 1888, Mr. Crowley entered the employ of the Thompson-Houston Electric Company, and was intimately associated with the late Chas. J. Van Depoele, in the early development of the company's electric railway system. Later, he was appointed chief of experts of the Thompson-Houston Company. From 1890 to 1893 he was railway manager of the company's southern office, with headquarters at Atlanta. During this period he was in charge of a number of the early railway installations, including Atlanta, Macon, Augusta, Savannah, Birmingham, Mobile, Chattanooga and Memphis. From 1893 to 1899 he was manager of the General Electric Company's railway department in Philadelphia, and during this time was actively engaged in the company's railway business in Philadelphia, Pittsburgh, Harrisburg, Baltimore, Washington and Richmond. When The American Railways Company was organized in 1899, Mr. Crowley was elected general manager. This company owns and operates the Scranton Railway Company and the Altoona & Logan Valley Electric Railway Company of Pennsylvania, the Bridgeton & Millville Traction Company and the Bridgeton Electric Company of Bridgeton, N. J., the electric railway, electric lighting and gas companies of Lynchburg, Va., the electric railway and electric lighting at Roanoke, Va., the electric railway and electric lighting in Huntington, W. Va., Ashland, Ky., and Ironton, Ohio, The Peoples Railway Company of Dayton, Ohio, The Springfield Railway Company of Springfield, Ohio, and the Chicago & Joliet Electric Company of Joliet, Ill.

CONDITIONS WHICH GOVERN THE TYPE OF CAR FOR CITY SERVICE

ROCHESTER, NEW YORK *

ROCHESTER, the second largest city in northern New York, is situated eight miles south of Lake Ontario and 69 miles east of Buffalo, on the direct route to Albany, Boston and New York. Both the Erie Canal and the Genesee River, which has its outlet in Lake Ontario, flow through the heart of the city, dividing it roughly into four unequal-sized sections. The opening of the Erie Canal, in 1825, gave impetus to Rochester's development, as it did all of northern and central New York. The importance of the canal's influence is evidenced by the rapid growth in population after its value had made itself felt. The census of 1910 showed that the city had 218,149 inhabitants, indicating an increase of more than 34 per cent. in 10 years. The estimated population in 1912 was 230,000.

Rochester ranks high in the state as a manufacturing center, and its principal manufactures are of a scientific and agricultural character rather than industrial, although large machine tools are made at one plant. The course of the Genesee River through the heart of the city had much to do with the development of its factories, and especially because three cataracts, one 96 ft., one 28 ft. and another 83 ft. high, furnish excellent water power. In 1905, the total factory output amounted to $82,750,000, and included clothing, shoes, photographic goods, lenses and optical goods, refined oil, foundry and machine shop products, furniture, tobacco, malt liquors, lumber, carriages and wagons, stationery and garden products. Rochester is, without doubt, the greatest center in the world for photographic goods. The great plants of the

* The fifty-first article of this series.

THE CITY
OF
ROCHESTER
AND
VICINITY
ROCHESTER RAILWAY LINES.
LAKE
ONTARIO
DURAND-EASTMAN PARK
GENESEE VALLEY PARK
CITY LINE
RIDGE RD
IRONDEQUOIT BAY

Eastman Kodak Company, and affiliated companies, which are located there, supply the entire world with cameras and other photographic supplies. It is the foremost nursery garden center of the United States and the mecca of agriculturists in the fruit belt of the state.

The city is readily accessible from all parts of the United

ROCHESTER TRAFFIC CONDITIONS AND CARS. Main and Clinton Streets. Clinton Street carries heavy traffic south from N.Y.C.& H.R.R.R. station. Cars from Clinton turn into Main. Second heaviest point on system

States and Canada, and is sufficiently close to one of the Great Lakes—Lake Ontario—to put it into direct maritime connection with the Canadian Atlantic seaboard and the large western lake cities. It is on the main lines of the New York Central & Hudson River and its subsidiary, the West Shore R. R., and is served also by either the main lines or important branches of the Lehigh Valley, Pennsylvania, and the Buffalo, Rochester & Pittsburgh and Erie Railroads.

Rochester has about 1264 acres of parks that add much to its attractiveness. Most of the streets in the residential sections are wide and lined with shade trees. There are many large, modern business buildings, fine residences and churches, schools and colleges.

The surrounding country is gently undulating, becoming

ROCHESTER TRAFFIC CONDITIONS AND CARS. State and Andrews Streets. The former bears bulk of north and south traffic and interurbans to Charlotte

somewhat rugged near the city, owing to the Genesee River Valley. Many of the streets are on grades, but these are, as a rule, long rather than excessively steep. The streets in the different parts of the city are laid out with comparative regularity and are fairly straight, except in the center near the river, where their course is interrupted for a short distance. It has been the practice to follow the rectangular street plan wherever feasible, but owing to topographical conditions and for other

good reasons, it was not possible to maintain parallelism in the various sections, as they affect each other.

The entire street railway system of Rochester is operated by the New York State Railways, which also operates a number of interurban lines, connecting Pittsford, Mertensia, Canandaigua, Seneca Castle and Geneva, N. Y., via the Rochester & Eastern Division, and Webster, Ontario, Williamson, Wellington, Sodus Point and Charlotte, N. Y., via the Rochester & Sodus Bay and Rochester Railway divisions.

The street railway system, till about half a year ago, was operated on the radial plan, all cars passing through some part of Main Street, the principal artery of traffic, and terminating near the center of the business district. Street railway traffic, alone, taxed the track capacity of Main Street

ROCHESTER TRAFFIC CONDITIONS AND CARS. Main Street at Franklin; an important interurban junction for the north and east

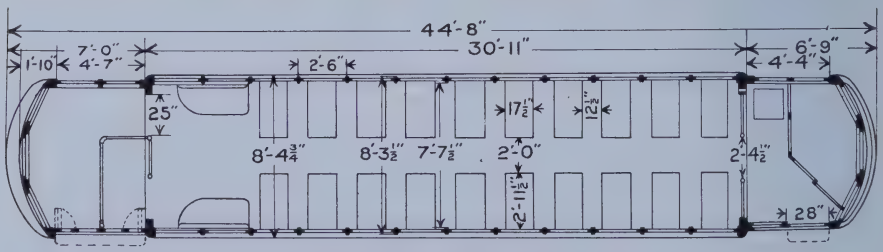
ROCHESTER TRAFFIC CONDITIONS AND CARS. St. Paul and Main Streets. Typical of the city's traffic conditions. Important crossing in new through-routing plan. Pedestrian traffic is heavy

to the utmost, not to mention the increasingly large number of other vehicles occupying the street. The number of pedestrians on Main Street was also very large, and as both sides of the street are of practically equal importance, car service was frequently delayed in avoiding persons at points other than

ROCHESTER TRAFFIC CONDITIONS AND CARS. New standard city car has novel steel bottomframe and steel sides to belt. Single-end operation. Brill No. 39-E trucks

legitimate cross-walks. To overcome this, as well as to provide a more comprehensive service without unduly increasing the number of cars necessary for the traffic, a system of through-routing was gradually put into effect.

The first step was a segregation of the lines into what appeared to be the most logical through routes. It was the purpose to relieve Main Street of as much traffic as possible, with a view toward alleviating congestion, accelerating traffic generally, indirectly benefiting the entire city by stimulating business in hitherto more or less neglected parallel streets and providing a more nearly complete service. If it had been possible to eliminate local traffic on the many interurban cars that pass through the principal streets, the problem might have been simpler, but it seems to have been either ill-advised or impossible to do so, and while such a condition might have accelerated movement slightly, interurban stops would have



ROCHESTER TRAFFIC CONDITIONS AND CARS. Motorman's cab enclosed by partition. Cross seats, 40 passengers; longitudinal, 6; total, 46. Platform floors slope 1 in. toward steps

been necessary at the principal traffic points anyhow, making a change of that character of rather doubtful advantage. The traffic revision led to the formation of through routes between the extremities, passing either through or near the center of the city. Much of the heavy Main Street traffic has been transferred to the nearby streets, and the number of

ROCHESTER TRAFFIC CONDITIONS AND CARS. Pipe stanchions used instead of bulkheads. Rear platform has two-leaf folding entrance and exit doors, controlled by the motorman through starting pulley and levers. Windows have stationary upper sashes; lower sashes raise

cars on Andrews Street, three blocks north of Main Street, has been much increased. As many interurban cars as possible were re-routed via that thoroughfare, and the city cars were despatched in all directions with the least possible joint use of track. The efficacy of the operating changes was almost immediately noticeable, especially on Main Street. During the rush hours, from 6.30 to 8.30 a. m. and 4.30 to 6.30 p. m., under the new method of through-routing, 261

cars in the morning and 311 at night are needed, and of these 310 cars per hour, or at intervals of $11\frac{3}{5}$ seconds, pass the heaviest traffic point on the system—the intersection of Main and State Streets. Under the old plan, which was partially operative prior to December 6, 1912, the interval between cars at the same intersection was 9 seconds, or at the rate of 400 per hour, indicating a $22\frac{1}{2}$ per cent. reduction in car congestion at that point alone. Under normal conditions, 166 cars suffice for the entire system, but for unusually heavy traffic demands, 345 double and 20 single-truck cars are available; since the exclusive use of double-truck cars in regular service, those of the single-truck type are not used.

The Rochester lines of the New York State Railways comprise 120.45 miles of standard gage track, of which the length of first track is 58.60 miles; second track, 52.11 miles; and sidings, crossovers and carhouses, 9.74 miles. The radius of the shortest curve is 33 ft. and the maximum grade represents $4\frac{1}{2}$ per cent. In 1912, the operation of the system developed 10,128,949 car miles with 63,488,213 revenue and 23,389,839 transfer passengers, showing a traffic density of 8.58 total and 6.27 revenue passengers per car mile.

The ordinary conductors' method of fare collection was originally employed and is still in limited use, but soon after the widespread adoption of the prepayment system, that plan was adapted to the Rochester city lines; a considerable number of double-truck, vestibuled, single-end prepayment cars, built by the G. C. Kuhlman Car Company, were thereupon placed in service and became the system's standard city type. Several months ago, 20 single-end prepayment cars, embodying the latest approved developments in electric car construction, were built for the New York State Railways by The J. G. Brill Company, and have superseded the older type as the standard for city service. They are mounted on Brill No. 39-E single-motor trucks, and in service tests, conducted with one of the new cars a few months ago, a power consumption

of only 2.3 per kilowatt-hours per car mile was shown, the weight of the car complete being 35,000 lb. A reduction of 25 per cent. in power consumption over the former standard car, which has two-motor trucks, was thus indicated.

An interesting form of steel underframe is used in the new cars. The side sills are ¼ by 18-in. steel plates, reinforced at the bottom with 5-in. channels, and along the top with 3 by ⅝-in. steel bars. Two box-girders, made up of two 3-in. channels and 3/16 by 5½-in. steel plates, form the center stringers, and in addition, are used as conduits for the electric cables. Both side sills and stringers terminate in 10-in. channel end sills. The crossings, for which 4-in. and 1½-in. inverted channels are utilized, are firmly secured to the side sills through gusset plates and riveted to the top plates of the box girders. Diagonal braces of 3 by ⅜-in. bars and diagonal corner braces of 6 by ¼-in. steel plates uniformly distribute all shocks through the bottom framing. The front and rear platforms, which measure 6 ft. 5 in. and 6 ft. 9 in. respectively, over the vestibule sheathing, are supported on Brill channel truss-form knees and on angles, which are riveted to the lower flanges of the end sill channels. The superstructure consists of 3⅝-in. corner and 2½-in. straight ash side posts, and continuous double top rails, between which the posts are gained. The steel side sills form the lower half of the side panels and 16-gage sheet steel covers the upper half.

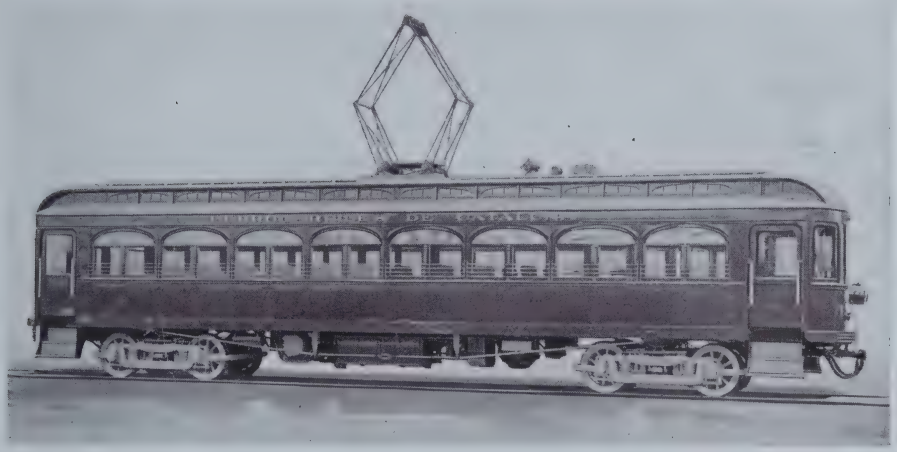
The windows have stationary upper sashes and the lower sashes raise their full height. Twenty Brill stationary-back cross seats and two longitudinal seats near the rear corners accommodate 46 passengers. In lieu of bulkheads, two pipe stanchions, 25 in. apart, separate the body and front platform, and two stanchions with a railing between them, giving a distinct entrance and exit, separate the body and rear platform. Both platforms have openings on the right side only, looking forward. The forward portion of the front platform is partitioned to form a motorman's cab, on the right side of which

is a glazed swinging door. The front exit door, which is 28 in. wide, is operated through a lever by the motorman and slides back into a pocket. A folding step is synchronized with it. The rear platform is divided as indicated in the diagram on page 72. In order to reduce step heights as much as possible, the floor is made to slope down one inch from the far side to the step side. Two double-leaf folding doors and a folding step are operated in unison by the conductor. The control consists of a system of levers actuated by a shaft on which is a pulley engaged by a leather belt, having loops at its free ends. This method of door control has been used in Rochester for several years and has been found to be simple and positive. The fact that both upper and lower panels in all doors are glazed is said to materially reduce platform accidents, owing to the better outlook of both the motorman and conductor.

LARGE INTERURBAN CARS FOR SPANISH 1200-VOLT ROAD

BRILL HIGH-SPEED TRUCKS

THE J. G. Brill Company recently built two large interurban cars for Ferrocarriles de Cataluña, an interurban electric road running between Barcelona, Sabadell and Tarrasa, Spain. Barcelona, with 587,200 inhabitants — the largest commercial and industrial city in the country — is situated in the province of Cataluña, on a bay of the Mediterranean Sea, about 60 miles south of the French boundary. Its manufactures consist principally of textiles, leather goods and iron and steel products, but the volume of its commerce eclipses that of its manufactures. The surrounding country is very hilly—almost mountainous—and is devoted mainly

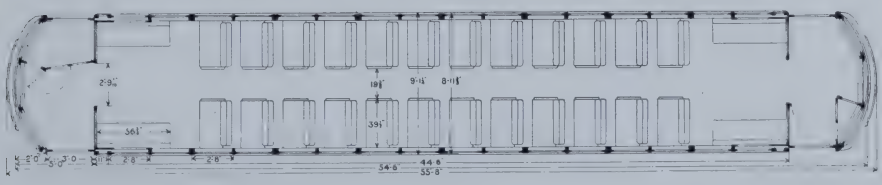


CARS FOR SPAIN. Operated on both 600- and 1200-volt circuits and run in multiple-unit service between Barcelona and Tarrasa, Spain. All doors air-operated from either platform. Composite bottomframe. Brill No. 27 high-speed interurban trucks

to cattle and sheep raising. Sabadell and Tarrasa are important suburban points. The latter is the northern terminal of the road.

These lines are operated at both 600 and 1200 volts, d.c., the higher potential being used in country districts and in a long tunnel, and the lower in cities. The line is substantially built, well graded and has a maximum grade of but 2 per cent.

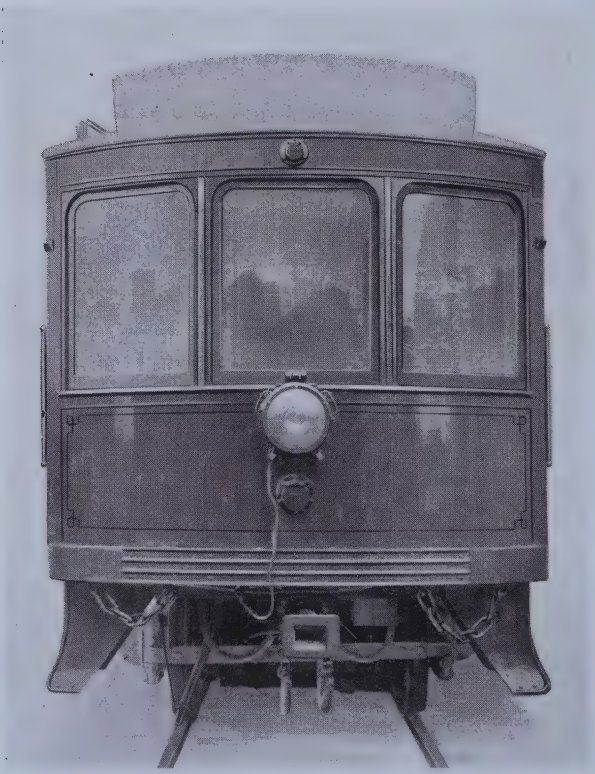
The new interurban cars present an unusually sturdy and symmetrical design and embody refinements that are expected to lead to most efficient operation. The twin windows have opalescent glass in the upper part and the lower sashes are made to raise and remain at any height; the hinged deck sashes are similarly glazed. The bulkheads have each two windows in which the lower sashes may be raised. Bulkhead



CARS FOR SPAIN. Partitions with folding doors form motorman's cabs. Cross seats, 48; longitudinal seats, 12; total, 60

doors are not used, but there are openings 2 ft. $9^{1}/_{16}$ in. wide. The seats are upholstered in dark green figured plush, and have high triple-bolster backs. All woodwork is mahogany and the ceiling is aluminum, painted a light blue. Ornamental clear-story side drop lights and a row of incandescents along the center furnish artificial illumination. The center row of lamps is connected with a storage battery that cuts in automatically wherever there is an interruption of propulsion current. Bronze parcel racks are placed over the seats in pairs, and each side post has a signal button.

The platforms, which are 5 ft. long, are vestibuled and have sliding doors and triple-tread steam-coach steps on both sides. To the right of the center vestibule window, on each platform, is a partition 1 ft. 7 in. long, with glazed upper panel, to which is hinged a two-leaf folding door. When the platform is used by the motorman or when serving as the rear platform, these folding doors assume the positions shown in the floor plan on page 77. The sliding vestibule



CARS FOR SPAIN. Motorman's cab behind window on left. Multiple unit service

CARS FOR SPAIN. Aluminum headlining. All interior wood mahogany. Center row lamps energized by storage batteries in emergencies. Lower window sashes raise full height; upper, stationary

doors are actuated by air and all four can be operated by two valves from either platform. One valve is in the motorman's cab and controls the front and rear platform doors on his left; the other, which is in front of the center vestibule window, controls the doors on his right. A sheet-steel trap is attached to each door, and, when closed, in passing through cities, the trap covers the step opening, but is inclined about 45 degrees, As soon as air is admitted to the operating mechanism the trap is drawn up against the door, after which the door moves back into its pocket. The usual type of trap-door is also furnished, but is used only on interurban runs, where stops are infrequent. The pantagraph trolley is maintained in its elevated position by springs and lowered by air.

The body framing is ash — a good example of standard practice — with $3\frac{5}{8}$-in. corner and $2\frac{1}{4}$ and $4\frac{1}{2}$-in. side posts.

Upper and lower window rails are made in one piece and, together with steel sheathing below the windows, add materially to the rigidity of the structure. The monitor roof is supported on ash carlines, reinforced by concealed steel rafters.

The superstructure is built on a composite bottom frame. The side sills are 4¼ by 8¾-in. yellow pine, reinforced on the inside with a ⅜ by 15-in. steel plate. A 2¼ by 8¾-in. yellow pine subsill, in two lengths, is bolted to the outside of the side sills, and is reinforced along its entire lower edge with a 2½ by 1½ by ⅜-in. angle. As the car is arranged for dismantling for over-sea shipment, the side posts are tenoned into the exterior subsills, so that they may be removed in one piece and the bottom frame remain intact. In addition to the side sills there are two 7-in. I-beam center stringers, with yellow pine filler, and two 5-in. I-beam intermediate stringers with fillers of the same material. These stringers come above the conical roller sidebearings under the body bolsters, and in passing through the bolsters reinforce the compression members at those points. The stringers run through from bumper to bumper, and, therefore, the end sills, which are 5 by 5¼-in. white oak, consist of five distinct lengths, tenoned into the side sills and wood fillers. Along the under side of each end sill is a 7 by 3½ by ½-in. angle, extending the full width of the body, to transfer the weight of the sides to the center and intermediate stringers. Oak crossings, 3½ by 5¾ in., are placed between the longitudinal members in the same manner as the end sills. All joints in the bottom frame are strengthened by corner irons. A 7 by 3½ by ½-in. Brill angle iron bumper, and an anti-climbing device are provided at each end.

The car is mounted on Brill No. 27 high-speed interurban trucks, capable of a speed of 60 miles per hour.

Length over corner posts	44 ft. 6 in.	Width over posts	8 ft. 11⅜ in.
Length over vestibules	54 ft. 4 in.	From track to side sills	3 ft. $3\frac{1}{16}$ in.
Length of platforms	5 ft. 0 in.	From side sills over trolley boards	9 ft. $8\frac{5}{16}$ in.
Centers of side posts	2 ft. 8 in.	Track to step	$16\frac{5}{16}$ in.
Width over sills	8 ft. 11⅜ in.		

From floor to center of headlining	8 ft. 7¾ in.	Type of motors	GE205—4-75 hp.
Step to step	10½ in.	Wt. of car body less electrical equipment	28,278 lb.
Step to platform	10½ in.	Wt. of electrical equipment	4,300 lb.
Seating capacity	64	Wt. of air-brake equipment	3,000 lb.
Type of trucks	Brill No. 27-MCB2	Weight of trucks	20,858 lb.
Wheel base	6 ft. 6 in.	Weight of motors	14,804 lb.
Diameter of wheels	36 in.	Total weight	81,240 lb.
Size of journal	4¼ in. by 8 in.		

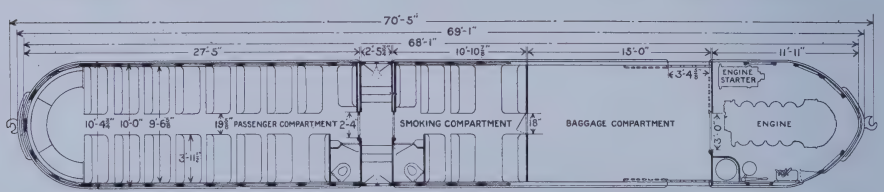
GAS-ELECTRIC MOTOR CARS FOR CHICAGO, MILWAUKEE & PUGET SOUND RAILWAY

STEEL CONSTRUCTION

THE Chicago, Milwaukee & Puget Sound Railway received, recently, from the Wason Manufacturing Company, two motor cars for service on branch lines in the State of Washington. They are equipped with the General Electric Company's gas-electric system. The road is the Pacific Coast extension of the Chicago, Milwaukee & St. Paul Railway from Mobridge, S. D., to Seattle and Tacoma, Wash., and was opened for through passenger traffic between Chicago and the Puget Sound region in 1910. The fact that it was opened so long after other transcontinental railway lines enabled the engineers to embody, in its construction, the experiences gained by others in building the earlier railways, the result being a road where the ruling gradients, in the direction of heavy tonnage have been held to a minimum. One of the new cars runs between Everett and Monroe, 14 miles, and in five single trips covers 70 miles per day. The other car runs from Seattle via Cedar Falls to Enumclaw, 62 miles, making one round trip, or 124 miles every day.

CARS FOR PUGET SOUND. Equipped with General Electric Company's gas-electric system. Steel construction

The cars are arranged for single-end operation, and are divided into passenger, smoking and baggage compartments. The cab, in the forward end, is 11 ft. 11 in. long; the adjoining baggage room is 15 ft. long; the smoking compartment, which follows, is 10 ft. 10⅞ in. long; and the passenger compartment, at the rear end, 27 ft. 5 in. A center entrance, 2 ft. 5¾ in. wide, with openings on both sides, is between the main and smoking compartments. The cab contains an eight-cylinder gas engine, direct-connected to a 600-volt generator, and a smaller auxiliary gas engine, driving an air pump, to supply power for starting the larger unit. There is a double-sash window on each side of the cab, that on the right being used by the motorman. Two windows, with the lower sashes made to raise, are in the parabolic front end. A wood partition, with a 36-in. sliding door, separates the cab from the baggage compartment. On each side of the baggage compartment is a sliding baggage door 3 ft. 3⅝ in. wide. The arrangement of the main passenger and smoking compartments and the center



CARS FOR PUGET SOUND. Smoking compartment seats 20 passengers; main compartment, cross and longitudinal seats, 50; rear circular seat, 7; total, both compartments, 77.

platform are shown in the diagram on page 82. The seating plan provides for 77 passengers, of whom 57 occupy the larger and 20 the smaller compartment. The cross seats are of the stationary-back type and are designed for three passengers each. The circular seat at the rear is for seven passengers. The seats in the smoking compartment are upholstered in

CARS FOR PUGET SOUND. Interior finished in mahogany. Toilets on each side of door opening. Seats in smoking compartment upholstered in Spanish leather

genuine Spanish leather, and those in the other compartment in friezette plush. The interior finish is polished mahogany, and the roof is sealed with composite board. The twin-windows have the lower sashes arranged to raise and to be held at any height. Continuous bronze parcel racks are provided.

The entire upper framing, exterior sheathing, carlines and roof coverings are steel. Steel tees are used for side posts, and the door posts in the baggage compartment are channel section, formed by placing an angle and tee together. There

are no rear corner posts, those continuing around the curved end having the same dimensions as the side posts. Wood filler is used in all posts, except those in the baggage section, to act as nailing strips for the interior finish and to provide grooves for the windows and curtain fixtures.

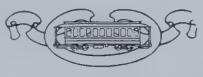
The steel bottom frame has 7-in. channel side sills extend-

CARS FOR PUGET SOUND. Passenger compartment has circular seat in rear. Cross seats for three passengers each. All lower sashes raise; upper stationary

ing from each end to the center entrance, where the bridging over the doorway, assisted by heavy truss rods underneath, carries the load over the opening. Two 7-in. I-beams, running through from end to end, are the principal longitudinal members of the framing, and pass under the center entrance, the floor of which is level with the body floor over these stringers. The crossings are 5-in. channels, and 2 by $\frac{3}{8}$-in. diagonal braces reinforce the other members of the structure. At the front and rear ends, where heavy friction draft-gears, with

M.C.B. couplers, are affixed between the two center stringers and securely tied by 7-in. channel transverse braces, there are two 6 by ⅜-in. braces extending from the ends over the center line to the outer extremities of the body bolsters. The curve at the rear end necessitated radial 5-in. channels, terminating at the I-beam stringers, instead of the usual crossings. All joints are reinforced with angles, and the diagonal braces are joined to the other components of the framing by heavy gusset plates.

Length over all	70 ft. 5 in.	Extreme width	10 ft. 5 in.
Length over vest. sheathing	69 ft. 1 in.	From track to side sills	3 ft. 6¾ in.
Length of center platform	2 ft. 5¾ in.	From side sills over radiator valve	10 ft. 10⅛ in.
Length of cab	11 ft. 11 in.	Track to step	20 15/16 in.
Length of baggage compt.	15 ft. 0 in.	Seating capacity	77
Length of smoking compt.	10 ft. 10⅞ in.	Type of motors	GE205—2-100 hp.
Length of main compt.	27 ft. 5 in.	Total weight	100,000 lb.
Centers of side posts	2 ft. 6 in.		
Width over sills	10 ft. 0 in.		



MORE INTERURBAN CARS FOR BIRMINGHAM, ALA.

BOTTOMFRAME AND CENTER ENTRANCE CHANGES

TEN novel steel-bottomframe center-entrance cars, which were built by the Wason Manufacturing Company for the Birmingham, Ensley & Bessemer R. R., Birmingham, Ala., several months ago, and fully described in the October, 1912, issue of BRILL MAGAZINE, were the forerunners of ten further cars for the same road, that have recently been built by The J. G. Brill Company. Both sets of cars follow closely a definite principle, but the reduction of width in the center entrance, the use of single, in place of double, steps, the addition of a front exit door and the resultant increase in seating capacity in the newer cars, necessitated important structural changes, especially in the steel bottomframe.

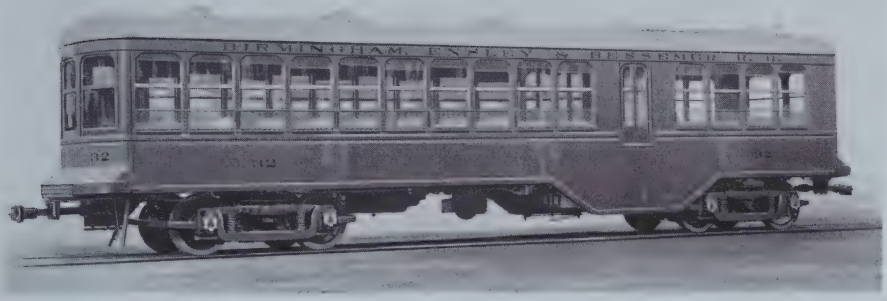
The center entrance virtually divides the car interior into two compartments, a short one in the rear for negroes, and a longer one, forward, for white passengers. In place of a double opening with distinct entrances and exits for both races, the total width has been reduced from 8 ft. 6 in. in the original cars to 5 ft. 1 in., leaving an opening, divided by a pipe stanchion, in which each half serves as both entrance and exit for its respective compartment, in the newer car. The top of the

CARS FOR BIRMINGHAM. Steel bottomframe and steel sides below belt rail. Folding exit door and folding step at right front corner. Brill No. 27-M.C.B.2 trucks

car floor, which is 3 ft. 5 in. over the rail-head at the bolsters, is ramped toward the center entrance from points about 5½ ft. from the entrance sides, making it 3 in. lower at the center platform. The conductor's station, on the far side of the car, is level with the car floor, as shown in the engraving on page 88. The platform floor is ramped, bringing it 1 in. lower at the step than at the conductor's station. In addition to the pipe stanchion, dividing the entrance, there are three smaller connected stanchions in a row, parallel to the longitudinal center line of the car, near the conductor's station. A sheet-iron partition is erected between the center stanchion and that at the doorway, for separating the white and colored compartments. A column, surmounted by an elliptical hand rail, and enclosing the door-control staff, is placed directly in front of the conductor's station. Removable chains are suspended between this column and the adjacent seat panels, preventing

passage between the two compartments. Two sets of two-leaf folding doors, hinged to the sides of the doorway, and a single folding step, discernable in the engraving on page 88, are operated simultaneously from the conductor's column. Both the upper and lower door panels are glazed. Behind the conductor's station is an inwardly-folding double emergency door, with glazed panels. This is shown in the engraving on this page.

The center one of the three front vestibule windows is



CARS FOR BIRMINGHAM. Single-end operation. Conductor's emergency door opposite center entrance

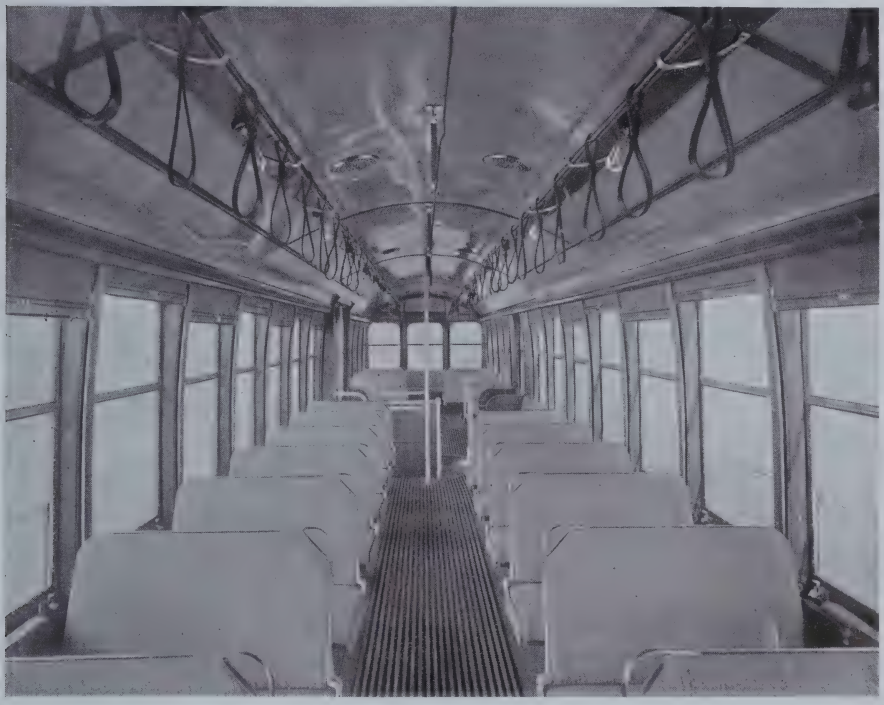
reserved for a motorman's cab, which is formed by the partitions shown in the diagram on page 89. At the motorman's right, on a sub-floor, is an inwardly-folding two-leaf door and folding step, with operating handle in the cab. A passage, 20 in. wide, gives access to the sub-floor from the white compartment. The sub-floor is similar in purpose to the depressed center platform floor, but is 13 in. instead of 10 in. lower than the car floor. A pipe railing separates the motorman's space from the exit. The windows are of the Brill semi-convertible type, in which both sashes disappear in roof pockets; ventilation is provided by ten Brill "Exhaust" ventilators in the roof. The seating plan provides for 39 white passengers, in the front compartment, on Brill stationary-back cross seats and longitudinal seats, and for 22 colored passengers in the other compartment, on five cross seats, two longitudinal seats and a circular seat in the rear, or 61 passengers in all, as compared with 57

passengers in the ten original cars. The new cars have a Brill plain arch roof, sealed with composition headlining. The interior woodwork is cherry, rubbed to a high polish. Leather hand straps are hung from poles on both sides of the car and push buttons for signaling both motorman and conductor are provided.

The ash side and corner posts are 2⅞ and 3⅝ in. thick respectively, and measure 30 in. between centers; they are set between and securely bolted to vertical angles that are riveted to the inner faces of the side sill angles and exterior sheathing. Their upper ends are tenoned into a continuous 2½ by 2¾-in. yellow pine top rail, reinforced by a 1⅛ by 9¼-in. letter panel. A one-piece belt rail, into which the posts are gained, relieves the top rail of considerable stress along each section.

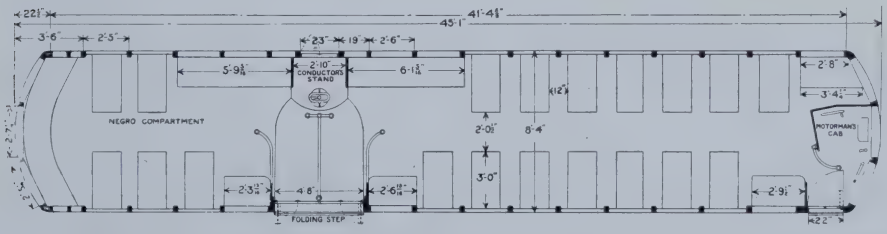
CARS FOR BIRMINGHAM. Each half of doorway used for both entrance and exit for its respective compartment. Sheet-iron partition separates white and negro compartments. Two-leaf folding doors and folding step are operated by the conductor through levers. Platform floor ramped 1 in. toward step. Car floor, 10 in. above platform floor

The most noteworthy feature of the bottomframe is the careful distribution of metal to obtain the greatest possible strength—allowing for a factor of safety of five — for each



CARS FOR BIRMINGHAM. Car floor ramped 3 in. toward center platform. Brill semi-convertible windows and Brill "Exhaust" ventilators. Circular seat for 5 colored passengers in rear

pound used and adherence to commercial shapes and flat bars, requiring no special rolling. The side sills are 6 by 3½ by ½ in. angles and run through from bumper to bumper, except that the sill on the right is interrupted at the front corner on account of the single front exit door. They are depressed 21 in. under the center platform, on both sides of the car, and the



CARS FOR BIRMINGHAM. Sub-floor at front exit, 13 in. below car floor. White compartment—cross seats, 28; longitudinal seats, 11; negro compartment—cross seats, 10; longitudinal seats, 7; circular seat, 5; total, entire car, 61

sill on the right is reinforced under the entrance with a 24 by ½-in. steel plate, to the top edge of which a 3½ by 3½ by ½-in. angle is riveted. This angle forms the outer edge of the center platform. Further reinforcement, at the center entrance, is given, of course, by the ⅛-in. steel side sheathing that extends from the lowest part of the bottomframing to the windows, along the entire carbody. The left side sill does not require the same degree of reinforcement opposite the entrance as the right sill, the body framing not being interrupted on that side. The only other longitudinal members are two 5-in. I-beam center stringers in each end, extending from the bumper to the nearer center-platform cross-bearer. The cross-bearers, which are especially stiff, are in the form of plate girders, 13½-in. deep at the ends, where they are secured to the side-sill reinforcing plates with angles, and 8 in. deep at the center, and are reinforced along the top and bottom edges with 2½ by 2½ by ⅜-in. angles. They are connected with 2 by 2 by ¼-in. angles that act as longitudinal platform-floor supports. The purpose of such heavy cross-bearers is to transfer the entire load carried by the center stringers to the sides at the center entrance, where the former are interrupted and, inversely, the load of the entrance back to the stringers. Other crossings are 4-in. channels, riveted to the longitudinal members through angles. Diagonal braces, 4 by ¼ in., reinforce the center of the framing against braking strains. Diagonal end braces of 4 by 3 by ⅜-in. angles distribute shocks, attributable to the draft gear, over the other bottomframe components. At the right forward corner, where the side sill is interrupted for the low floor of the front exit-door, compensation is made for the interruption by two 4-in. channels, forged to a "U" shape, in the horizontal portion of which the sub-floor rests, and by a forged angle knee that is riveted to the undersides of the sill and channel. Brill angle iron bumpers, with anti-climbing devices, are riveted to the ends of the longitudinal members of the bottomframe.

The cars are mounted on Brill No. 27-M.C.B.2 trucks having solid forged side frames with integral pedestal jaws and Brill half-ball brake hangers. They are capable of a speed of 60 miles an hour.

Length over bumpers	46 ft. 9 in.	Platform to floor	10 in.
Length over vestibule sheathing	45 ft. 1 in.	Seating capacity	
Centers of side posts:		White compt.	39
In white compt.	2 ft. 6 in.	Negro compt.	22
In negro compt.	2 ft. 5 in.	Type of trucks	27-M.C.B.2
Width over sills	8 ft. 4 in.	Wheel base	6 ft. 0 in.
Width over posts	8 ft. 4 in.	Diameter of wheels	34 in.
Extreme width	8 ft. 6 in.	Size of journal	3¾ by 7 in.
From track to side sills	2 ft. 11 in.	Type of motors	GE 216—4-50 hp.
From side sills over trolley boards	8 ft. 4⅝ in.	Weight of car body less elec. equipment	18,000 lb.
From floor to center of headlining	7 ft. 4⅞ in.	Weight of elec. equipment	2,800 lb.
Track to step	14 in.	Wt. of air-brake equipment	1,800 lb.
Step to platform	14 in.	Weight of trucks	16,000 lb.
		Wt. of motors	11,200 lb.
		Total weight	49,800 lb.

LIGHT-WEIGHT CLOSED TYPE FOR MERIDIAN, MISS.

BRILL PLAIN ARCH ROOF

AN order, recently shipped from the plant of the American Car Company for Meridian, Mississippi, consisted of a type of car which deviates from the cars furnished this city in the past. This is a light-weight closed type, constructed with plain arch roof and mounted on Brill No. 21-E single-truck.

Meridian, the county seat of Lauderdale County, Mississippi, is situated in the eastern part of the State, about 15 miles from the Alabama border. It is a railroad center of much importance and the growth in population and diversified industries has been rapid; in the last ten years the population has nearly doubled.

The Meridian Light and Railway Company, besides operating the street railway system and furnishing its own power, supplies light to the city. It owns Highland Park, which during most of the year is a source of extensive revenue. The lines consist of 11½ miles of standard gage single track, having a number of grades, one being 7% for a considerable distance. This, as well as the fact that the company finds it more satisfactory to operate a large number of units of small capacity at frequent intervals than to operate fewer of larger capacity, accounts for the short length of the carbodies. The new type is two feet longer in the body than cars of former orders, but the platforms are of the same dimensions. A test with a recording wattmeter showed that this car consumed only 1.76 kw. h. per mile in actual operation for a period of three days' test as against 2.87 kw. h. per mile for the older cars, and the new light car is capable of maintaining a better schedule.

The upper sashes are stationary, while the lower raise their full height. Heavy wire screens, in two sections, extend from the window sills up to the bottom of the upper sash and from corner post to corner post. Below the windows on both sides

CARS FOR MERIDIAN. Body weighs only 8000 lbs. Service tests show 1.76 kw. hours per mile as compared with 2.87 kw. hours for old cars. Motorman operates front and rear doors on right side. Brill No. 21-E truck

CARS FOR MERIDIAN. No bulkheads. Seating capacity, 32. Upper window sashes stationary; lower raise full height. High wire-mesh window guards.

is a sheathing of insulated sheet steel. The platforms have door openings on each side, the openings being provided with two doors which swing outwardly and, as shown in the photograph, the steps are stationary and covered with shields attached to the bottom of the doors. The operation of the doors is novel and interesting, the arrangement being to open and close those to the motorman's right on the front and rear platforms, thus making the motorman responsible for allowing the passengers to enter and leave while the car is in motion. The interior is finished in birch, stained mahogany color, and the ceiling is of composition board.

The upper framing consists of white ash corner posts, 2½ in. thick, and side posts of the same, 1½ in. thick. The posts are braced at the bottom by angles on each side securely riveted to the reinforcing sill plate. The bottom framing is

constructed of side sills of yellow pine, 3½ by 7¾ in., reinforced on the inside with 12 by ⅜-in. steel plates; end sills of white oak, 2¼ by 4 1/16-in.; and crossing of the same, 2½ by 4 1/16-in.

Length over corner posts	20 ft. 8 in.	Step to platform	12 in.
Length over platforms	29 ft. 8 in.	Platform to floor	9 in.
Length of platforms	4 ft. 6 in.	Seating capacity	32
Centers of side posts	2 ft. 6 in.	Type of truck	Brill No. 21-E
Width over sills	8 ft. 0 in.	Wheel base	7 ft. 6 in.
Width over posts	8 ft. 2 in.	Diameter of wheels	33 in.
From track to side sills	2 ft. 4 in.	Type of motors	GE81-2
From side sills over trolley boards	8 ft. 10½ in.	Wt. of carbody less elctical equipment (approx.)	8,000 lb.
From floor to center of headlining	7 ft. 11 in.	Weight of trucks	5,800 lb.
Track to step	14 in.	Weight of motors	4,200 lb.
		Total weight	18,000 lb.

WOODS USED IN INTERIOR FINISH OF CARS

PART I

CAR interiors, like architecture and furniture, have had their periods of finish and style. Early car designs brought forth fanciful decorative effects, and later these were elaborated upon in many ways. Complex color schemes, artistic mouldings, intricate carvings, and in higher-grade work, heavy draperies, were long considered essential. During the growth of the industry, and especially when the necessity for faster and more frequent service, better sanitation and efficiency became apparent, the tendency was toward plainer interiors, and while fancy hardwoods continued in favor, ash and cherry predominated. From about 1894 to 1905, when many horse and cable lines were electrified, ash was the principal wood used. Since 1905 cherry has been employed to a greater extent than any other.

Among the woods most largely used are ash, cherry, ma-

hogany, quartered oak, teakwood, vermillion, California redwood, basswood, maple and birch. Ash is valuable for its strength, elasticity and light weight, and for these reasons is used extensively as a finishing wood in summer cars, where the side posts are part of the interior finish. It is extensively grown in North America, and that used in car building is usually taken from the eastern and central states and from southeastern Canada. Cherry is usually a reddish-brown, growing darker with age, and the deep red frequently seen is due to stain. It has become rather scarce in recent years, and is found mainly in the eastern and central sections of the United States. Mahogany is preferred to most woods for cabinet work, because it is easily worked, and is usually a beautiful brownish-red color and presents a variety of handsome graining. In cars for South America, and generally where the climate is damp and insects abound, mahogany has shown longer life than other woods, except teak. The finest variety comes from Tabasco, Mexico, and the African Gold Coast, and other good grades are grown in South and Central America. Oak is not used as extensively in electric as in steam car practice, being preferred principally for its handsome grain when "quartered." Its beauty is noticeable only when laid in wide panels. Teakwood is very valuable and is grown largely in Northern India, China and the Philippines, and a few other tropical regions, where it is practically the only wood used in car work, owing to its ability to resist the ravages of insects. Vermillion is a handsome wood of the mahogany family and grows chiefly in eastern Asia and the Malaysian Archipelago. It is rarely used in car building; only when exceptional beauty and richness of finish are desired, as it is remarkably heavy and hard to work. The most beautiful effects are produced when inlaid with white holly. California redwood is almost too soft for car interiors, but is used at times for its rich red color and straight grain and the fact that it does not warp or shrink readily. The trees grow to a

very large size and are closely related to the "Big Trees" of California. Basswood, or "linden," as well as maple, grow in southeastern Canada and in the central, eastern and southern parts of the United States. They are used largely where light-colored woods are desired for contrast with poplar, especially where the roof boards are shown in summer cars. Birch is utilized principally as veneer in headlinings, because of its natural luster and fancy grain. Most birches grow in southern Canada and the northeastern United States. The paper birch, whose bark is so extensively used for canoes and ornaments, is not of the variety employed in car work. Bird's-eye and straight maple are often veneered for headlining.

In car interiors only the finest lumber is used, after being thoroughly dried and seasoned. Some of the finer grades of tropical hardwoods are extremely expensive, because of the difficulty in obtaining them.

In car work the surfaces requiring a finish are narrow or of small area, and for that reason doors, paneling and wainscoting are cut from solid wood instead of being veneered. The vibrations and strains to which car sides are subjected are transferred in a small degree to the interior paneling and experience has shown better results with solid wood. In steam railroad coaches and sleeping cars the bulkhead panels and the exposed surfaces under the upper berths are often veneered; in the former case because veneers are taken from the highest grade lumber and present the finest grain, and in the latter owing to the curve assumed by the under side of the berth, which would probably hazard bending the solid wood.

In electric car practice the posts are rarely stained to match the interior finish, but are faced with a strip of finishing wood. However, in the Brill semi-convertible car posts the sides are stained where they are not covered by the parting strip of finishing wood. [TO BE CONCLUDED]

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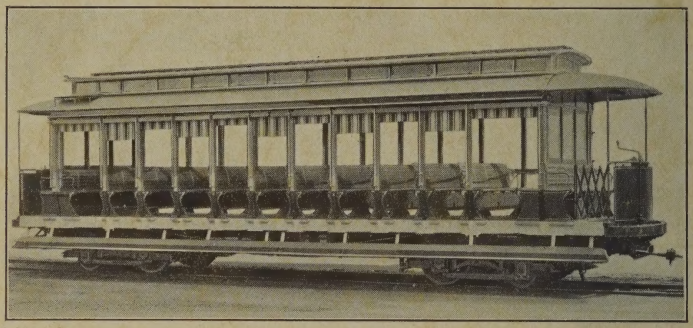

BRILL "NARRAGANSETT" CAR

PATENTED

Public and managers alike favor the double-truck open summer car. The public like the unobstructed view, the breezy atmosphere, "smoking on the four rear seats," and the holiday spirit the car induces when used for excursions. Managers like its great carrying capacity—greater than any other type—its increased revenue, low power consumption per passenger, and rapidity of boarding and alighting. But the objection to the old types, when the trucks have equal-sized wheels, lies in the excessive step heights—19½ in. from track to step and 17 in. from step to floor. Dangers lurk there and kill the car's otherwise undoubted advantages. But the Brill "Narragansett"—the perfect summer car—eliminates the danger of step accidents by introducing an intermediate sill-step, reducing the initial step to 16 in., making the next 13 and leaving 7½ in. to the floor. The sill-step is the horizontal web of Z-bar side sills; the posts are held in special pocket castings; the car isn't any wider than single-step open cars—it has the strongest and safest possible construction, and is the only practical double-step open car.

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